UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Forest Insect & Disease Management
P.O. Box 5895, Asheville, NC 28803

Report #77-1-19

5230
August 9, 1977

Mr. Robert Mantie, Orchard Manager
Container Corporation of America
P.O. Box 626
Calahan, Florida 32011

Dear Mr. Mantie:

At the request of Lee Draper, Larry Barber (Entomologist) and Jim Bryant (Biological Aide) visited the Container Corporation of America seed orchard on June 22-23, 1977. Mr. Draper reported that insect control on the orchard was less than desired and requested help in evaluating the spray program. The orchard spray program was discussed in detail. The information obtained is found in Appendix 1.

A spray deposit analysis was made to determine if spray coverage, which is essential for maximum insect control, was satisfactory. Spray cards made from Kromekote® paper were affixed to 12-ounce soft drink cans which were then hung from branches in the upper and middle crowns of two 40-foot slash pine trees (Fig. 1). In test one, spray cards were also hung in the bottom third of the crowns.

Prior to the spray evaluation, thirteen spray nozzles with an assortment of different disk and cores were used. For the first run the nozzles were changed to a combination of D6-56, D6-46, and D4-25 disk and cores with the larger nozzles, i.e., D6-56 placed on the top uppermost position of the spray boom (Appendix 2). In test one, only one side of each tree was sprayed while in the remainder of the tests both sides were sprayed. The spray mix contained 2 pints Rhodamine dye and one pint of sticker in 100 gallons of water. After spraying, the cards were allowed to dry and then removed from the trees for examination. Analysis of the cards from test one indicated the normal spray procedure of spraying only one side of each tree crown was not giving satisfactory coverage (Fig. 2). Coverage in the lower and middle crown nearest the sprayer was good while in the upper crown coverage was light. Most of the cone crop is produced in the upper crown, therefore, adequate spray coverage to the upper crown is essential.

The disk and core nozzle arrangements were changed from test two to accommodate spraying both crown faces with the same amount of spray material used in test one (half rate each side). This was accomplished by plugging the nozzles on the boom in locations 1, 2, and 3 while decreasing the size and volume of nozzle No. 7. After spray test two, the cards were again examined. Spray coverage in the upper crown was not satisfactory. Calculations of spray volume showed application rates were in excess of 2 gallons per tree. However, label rate recommendations for Guthion 2L are 1-2 gallons per tree applied with a low volume sprayer at one percent concentration.

For test three, several nozzles were changed so all were D4-25 which in combination applied 1.22 gallons of spray mix per tree. Analysis of the spray cards indicated insufficient coverage in the upper crown.

Spray runs 4, 5, and 6 were further attempts to increase spray deposits in the upper crown. In general, spray coverage was satisfactory in the middle crown and only marginal in the upper crown. The best coverage was obtained in spray tests 4 and 5 (Figs. 4 and 5).

The Bes sprayer is fitted with a pecan volute but not with internal or external wind deflectors and the air blast cannot be "aimed" at the upper crown. The only adjustments available are to change positions and sizes of the nozzles. Consideration should be given to modifying the sprayer in such a manner that the air blast can be directed to a particular area of the crown.

The amount of spray necessary to cover orchard trees has been studied by Neal Overgaard, Entomologist, Alexandria Field Office and Ed Merkel, Project Leader, Southeastern Forest Experiment Station (Table 1). I believe the 1.22 gallon rate per tree as tested in spray runs 4 and 5 should be adequate to obtain adequate coverage and insect control if the spray can be directed to the upper tree crown.

The orchard is presently using the Guthion® 2L formulation. Earlier communication with Chemagro, the manufacturer, indicated the active ingredient may crystallize and settle out from the solvent system if the concentrate is stored below 55°F. Changing to the 2S formulation will eliminate this potential problem. Present stocks of 2L that have been stored below 55°F. should be agitated before adding to water. To agitate the concentrate, roll the cans on the ground before opening. This should be done when the temperatures are in the 70-90°F. range. This will remix the active ingredient with the solvent system.

In summary, my recommendations are as follows:

1. Spray both sides of each cone bearing tree.
2. Concentrate on spraying the upper and middle third of each tree crown.
3. Use the Guthion® 2S formulation.

4. Use a sticker.
5. Modify the sprayer by adding directional wind deflectors.
6. Use 1-2 gallons of 1 percent Guthion® spray mix per tree.
7. Use ten D4-25 nozzles in the same positions as in spray tests 4 and 5.

I feel that adopting the above recommendations will help improve cone and seed insect control on your orchard. If you have any comments or questions concerning any of these recommendations or comments, please let me know.

Sincerely,

Larry R Barber

LARRY R. BARBER
Entomologist

Table 1. Gallons of spray required per tree on seed orchard trees.

Tree Species	No. Trees Sprayed	Average Tree Hgt. (Ft.) (Range)	High Volume Drench Gal/Tree (Range) (6 Pts/ 100 Gals)	Low Volume Mist/Blower Gal/Tree 30 Pts/100 Gal (5x)
Loblolly	8	28.6 (25-34)	3.78 (2.52-7.98)	0.76 (3/4)
Shortleaf	5	23.6 (21-24)	2.56 (2.10-3.15)	0.51 (1/2)
Loblolly	10	20.2 (18-23)	1.70 (1.47-2.39)	0.34 (1/3)
Shortleaf	5	15.2 (13-18)	0.97 (0.63-1.68)	0.19 (1/4)
		Merkel's Work		
Longleaf	55'			2.00
Slash	40'		8	

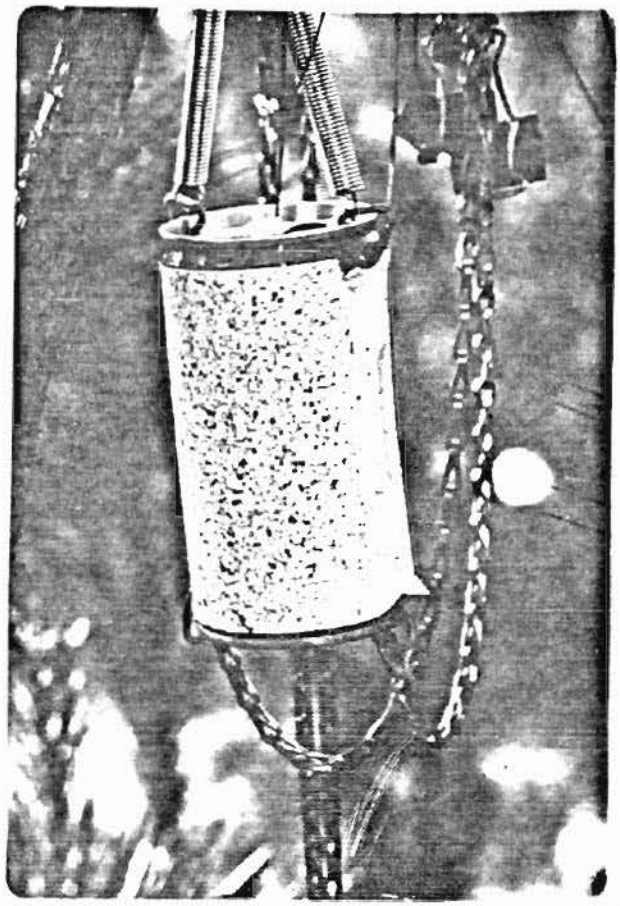

Figure 1. Spray cards made from Kromekote(R) paper affixed to soft drink can used to determine spray coverage.

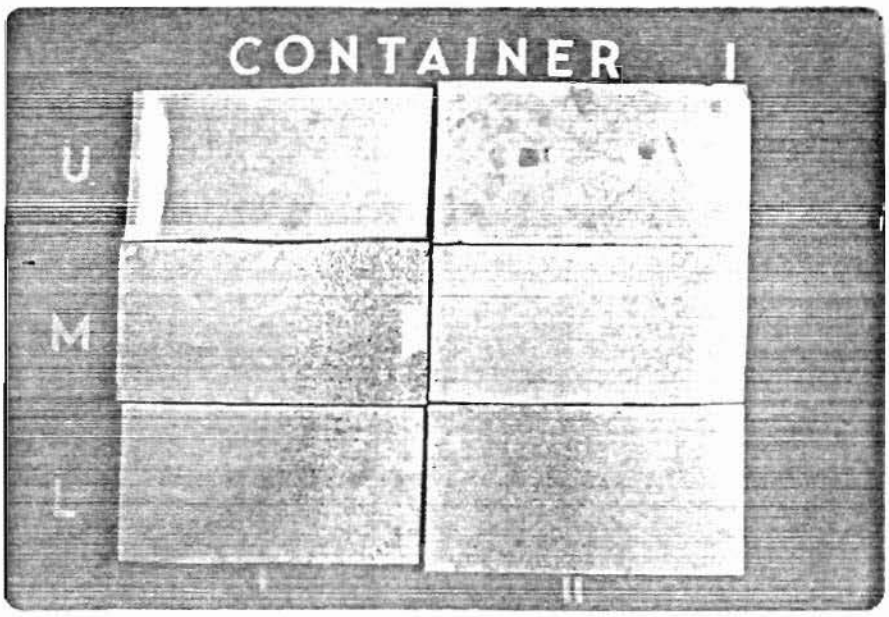

Figure 2. Spray coverage obtained during spray trial 1 with Bes sprayer (mist-low volume). Spray applied to only one side of each tree crown. Cards placed in two trees within upper (u), middle (m), and lower (L), crown areas.

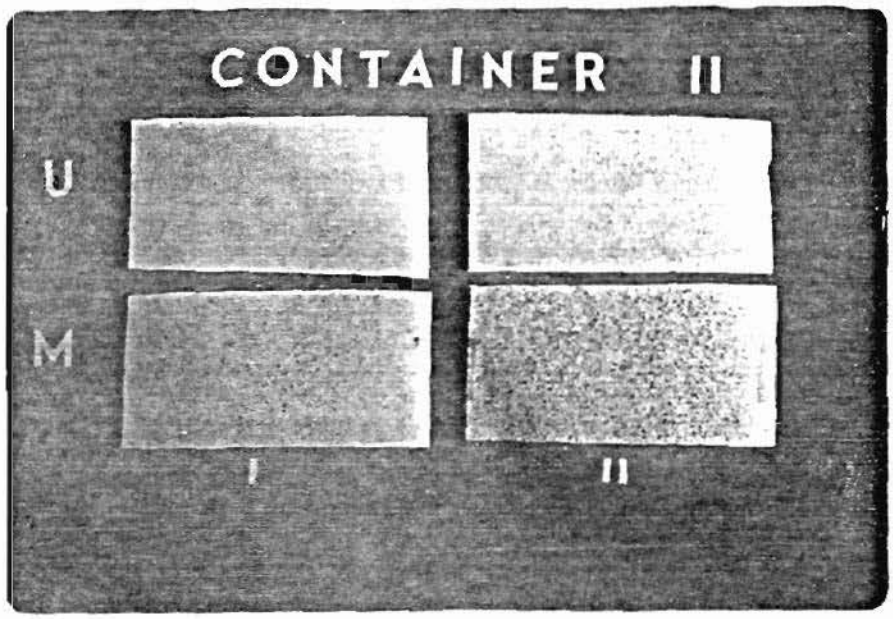

Figure 3. Spray coverage in trial spray run 2 showing satisfactory coverage on entire surface of cards in middle (m) crown. Spray was not adequate in upper crown.

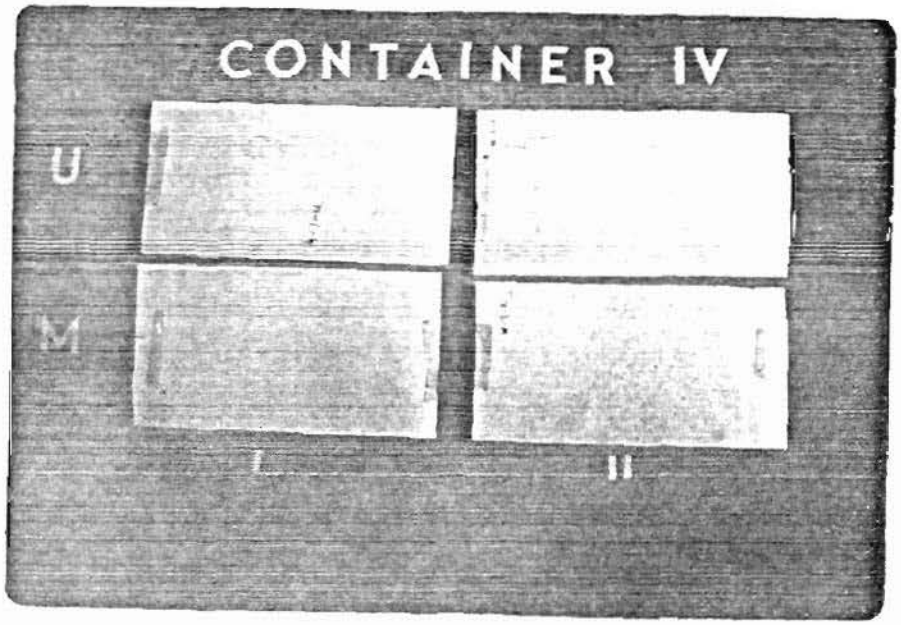

Figure 4. Spray run 4 showing coverage in the upper (u) and middle (m) crown areas of two trees.

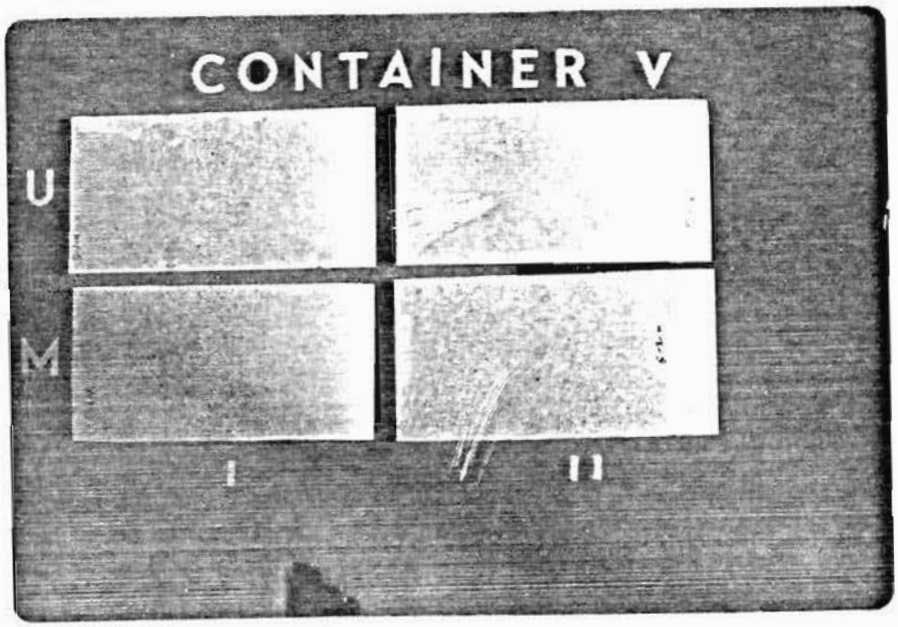

Figure 5. Spray run 5 showing coverage in the upper (u) and middle (m) crown area of two trees.

Appendix 1. Background information for the Container Corporation of America seed orchard spray evaluation conducted June 1977 near Calahan, Florida.

PARAMETERS	CALAHAN SEED ORCHARD
Row Spacing	30 ft.
Tree Spacing	30 ft.
Tree Species	Slash
Tree Height	40 ft.
Trees Per Acre (est.)	40
Sprayer Type	Low Volume - mist Bes Sprayer Model 3825
Nozzles	16
Disk & Core nozzle Combinations in use on the orchard prior to this evaluation (number each)	D4-56 (1), D6-56 (3), D7-56 (1), D6-46 (1), D4-46 (1), D4-25 (4), D6-25 (2)
Gallons Per Minute with Above Setup	20.19 g.p.m.
Recommended Core & Disk Combination (number)	D4-25 (10 ea.)
Gallons Per Minute with Recommended Setup Above	6.1 g.p.m.
PSI	175-220 (avg. 200)
Application Per Tree	2.5 gallons
Application Rate Per Tree with Recommended Nozzles	1.22
Recommended Per Tree[1/]	1-2
Applications Per Year	4
Chemical Used	Guthion 2L
Spray Mix	30 pints/100 gallons wate
Spray Concentration	1.0 percent
Sides of Trees Sprayed	2[2/]

[1/] Label recommendations.

[2/] Only one side sprayed in 1976.

Appendix 2. Disk and core nozzle arrangements and application rates for spray evaluation spray tests on Container Corporation of America seed orchard, Calahan, Florida.

		PRE-TREATMENT[1]	1[1]	SPRAY TESTS 2	3	4 and 5	6
Top	1	D4-56	D6-56	-	D4-25	D4-25	D4-25
Nozzle	2	D6-56	D6-56	-	-	D4-25	-
Position	3	D6-56	D6-56	-	-	D4-25	D4-25
	4	D7-56	D6-56	D6-56	D4-25	D4-25	-
	5	D6-56	D6-56	D6-46	D4-25	D4-25	D4-25
	6	D6-46	D6-46	D6-46	D4-25	D4-25	-
	7	D4-46	D6-46	D4-25	D4-25	D4-25	D4-25
	8	D4-25	D4-25	D4-25	D4-25	D4-25	D4-25
	9	D6-25	D4-25	D4-25	D4-25	D4-25	D4-25
	10	D6-25	D4-25	D4-25	D4-25	D4-25	D4-25
	11	D4-25	D4-25	D4-25	D4-25	-	D4-25
	12	D4-25	D4-25	D4-25	D4-25	-	-
	13	D4-25	D4-25	-	-	-	D4-25
	14	-	-	-	-	-	-
Lowest Nozzle	15	-	-	-	-	-	D4-25
Gallons of Spray Applied Per Tree		2.5[2]	2.04[1]	2.08	1.22	1.22	1.22

[1] Only one side of each tree was sprayed in 1976 and in spray test one. Both sides were sprayed in tests 2-6.

[2] Registered label recommendations for Guthion 2L low volume sprayers is 1-2 gallons per tree of the 1 percent spray mix.